Ash Creek Associates
Environmental and Geotechnical Consultants

December 31, 2012

Mr. Dwight Leisle
Port of Portland
7200 NE Airport Way
Portland, Oregon 97218

Re: Riverbank Pipe Sampling Results
Willamette Cove Upland Facility
Portland, Oregon
ECSI No. 271
1056-03

Dear Mr. Leisle:

This letter presents the results of soil sampling activities completed under a riverbank pipe at the Willamette Cove Upland Facility (the Facility; Figures 1 and 2) in the St. Johns area of Portland, Oregon. Work at the Facility is being conducted under Voluntary Agreement EC-NWR-00-26 between the Port of Portland (Port), Metro, and the Oregon Department of Environmental Quality (DEQ; the Consent Order). The sampling activities were completed in accordance with the DEQ-approved scope presented in the *Riverbank Pipe Observations* letter (Ash Creek, 2012). The methods, procedures, and results of the chemical analyses are presented in this letter.

BACKGROUND

The DEQ completed a site visit during the former Wharf Road area sampling completed in August 2012. Potential riverbank pipes were observed in various locations. The 5-inch steel pipes observed in the riverbank in the vicinity of locations WR-191 and WR-192 were considered to be in place (Figure 2); a photograph showing the relative position of WR-191 and WR-192 is provided in the photograph log included as Attachment A (Photograph 1). The DEQ agreed that sufficient laboratory analytical data were already available to complete the evaluation of the historical pipe in the vicinity of WR-192, however, soil sampling was recommended for the pipe in the vicinity of WR-191.

SAMPLING ACTIVITIES

Preparatory Activities

The following activities and schedule coordination were completed in preparation for the field work.

- Health and Safety Plan (HASP). Ash Creek Associates, a Division of Apex Companies, LLC (Ash Creek) prepared a HASP for its personnel involved with the project.
- Coordination of Facility Access. The work activities were conducted in coordination with Metro.

Surface Soil Sampling

A soil sample was collected approximately 1.5 feet downslope of the riverbank pipe in the vicinity of WR-191 (Photograph 6). The sample was collected from approximately 0 to 6 inches below the ground surface (bgs). The sample was collected in accordance with Standard Operating Procedure (SOP) 2.2 (Attachment B). The sample was field screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and for the presence of petroleum hydrocarbons using a sheen test in accordance with SOP 2.1 (Attachment B). No field indications of VOCs or petroleum hydrocarbons were observed.

CHEMICAL ANALYSES

The soil sample from was submitted for the following analyses.

- Metals by EPA 6000/7000 Series Methods;
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM; and
- Polychlorinated biphenyls (PCBs) by EPA Method 8082.

ANALYTICAL RESULTS

The soil sample was submitted to ALS Environmental Services in Kelso, Washington for chemical analysis. A copy of the laboratory report is included in Attachment C (in CD-Rom format due to the length of the Level III deliverable report). The sample was analyzed on a standard turnaround time (up to 10 business days). A quality assurance review of the data was completed. No qualifiers were attached to the data as a result of our review and the data was determined to be of sufficient quality for use in this letter.

The results of the chemical analyses are provided in Table 1.

SITE RECONNAISSANCE

The sampling described above was conducted during a period of rain in order to evaluate the potential for discharge from pipes WR-191 (Photographs 2 and 3) and WR-192 (Photographs 4 and 5). No discharge was observed from either riverbank pipe and therefore they are considered inactive.

CONCLUSIONS

These data will be evaluated in the *Source Control Evaluation.*

If you have any questions regarding these activities, please contact the undersigned at (503) 924-4704.

Sincerely,

EXPIRES
12/31/13

for

Michael J. Pickering, R.G.
Senior Associate Hydrogeologist

Ian Maguire
Staff, Engineering Group

REFERENCES

Ash Creek, 2012. Riverbank Pipe Observations, Willamette Cove Upland Facility Portland, Oregon, ECSI No. 271. September 26, 2012.

ATTACHMENTS

Table 1 – Soil Analytical Results

Figure 1 – Facility Location Map
Figure 2 – Upland Facility Plan

Attachment A – Photograph Log
Attachment B – Selected Standard Operating Procedures
Attachment C – Laboratory Analytical Report (CD-ROM)

Table 1 - Soil Analytical Results
Willamette Cove Upland Facility
Portland, Oregon

Sample ID	WR-191
Date Sampled	10/31/2012
Sample Interval (inches)	0-6
Metals (EPA 6000/7000 Series Methods; mg/kg)	
Antimony	1.65
Arsenic	4.42
Beryllium	0.223
Cadmium	0.126
Chromium	13.7
Copper	32.2
Lead	32.9
Nickel	16.9
Selenium	<1.0
Silver	0.035
Thallium	0.040
Zinc	64
Mercury	0.049
Polycyclic Aromatic Hydrocarbons (EPA 8270 SIM; ug/kg)	
1-Methylnaphthalene	1.0 J
2-Methylnaphthalene	1.6 J
Acenaphthene	3.4 J
Acenaphthylene	2.6 J
Anthracene	7.0
Benzo(a)anthracene	41
Benzo(a)pyrene	56
Benzo(b)fluoranthene	76
Benzo(g,h,i)perylene	46
Benzo(k)fluoranthene	26
Chrysene	58
Dibenz(a,h)anthracene	12
Fluoranthene	69
Fluorene	1.8 J
Indeno(1,2,3-cd)pyrene	53
Naphthalene	3.5 J
Phenanthrene	26
Pyrene	67
Polychlorinated Biphenyls (EPA Method 8082; ug/kg)	
PCB-1016 (Aroclor 1016)	<100
PCB-1221 (Aroclor 1221)	<200
PCB-1232 (Aroclor 1232)	<100
PCB-1242 (Aroclor 1242)	<100
PCB-1248 (Aroclor 1248)	<100
PCB-1254 (Aroclor 1254)	<100
PCB-1260 (Aroclor 1260)	<100
PCB-1262 (Aroclor 1262)	<100
PCB-1268 (Aroclor 1268)	<100

Notes:

1. µg/kg (ppb) = micrograms per kilogram (parts per billion)
2. mg/kg (ppm) = milligrams per kilogram (parts per million)
3. < = Not detected above the method reporting limit (MRL)
4. J = Estimated.

Base map prepared from USGS 7.5-minute quadrangles as provided by TerraServer.

0 2,000 4,000

Approximate Scale in Feet

N

Facility Location Map

Riverbank Pipe Sampling Results

Port of Portland / Metro

Willamette Cove Upland Facility - Portland, Oregon

Ash Creek Associates
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APEX

Project Number	1056-03	Figure
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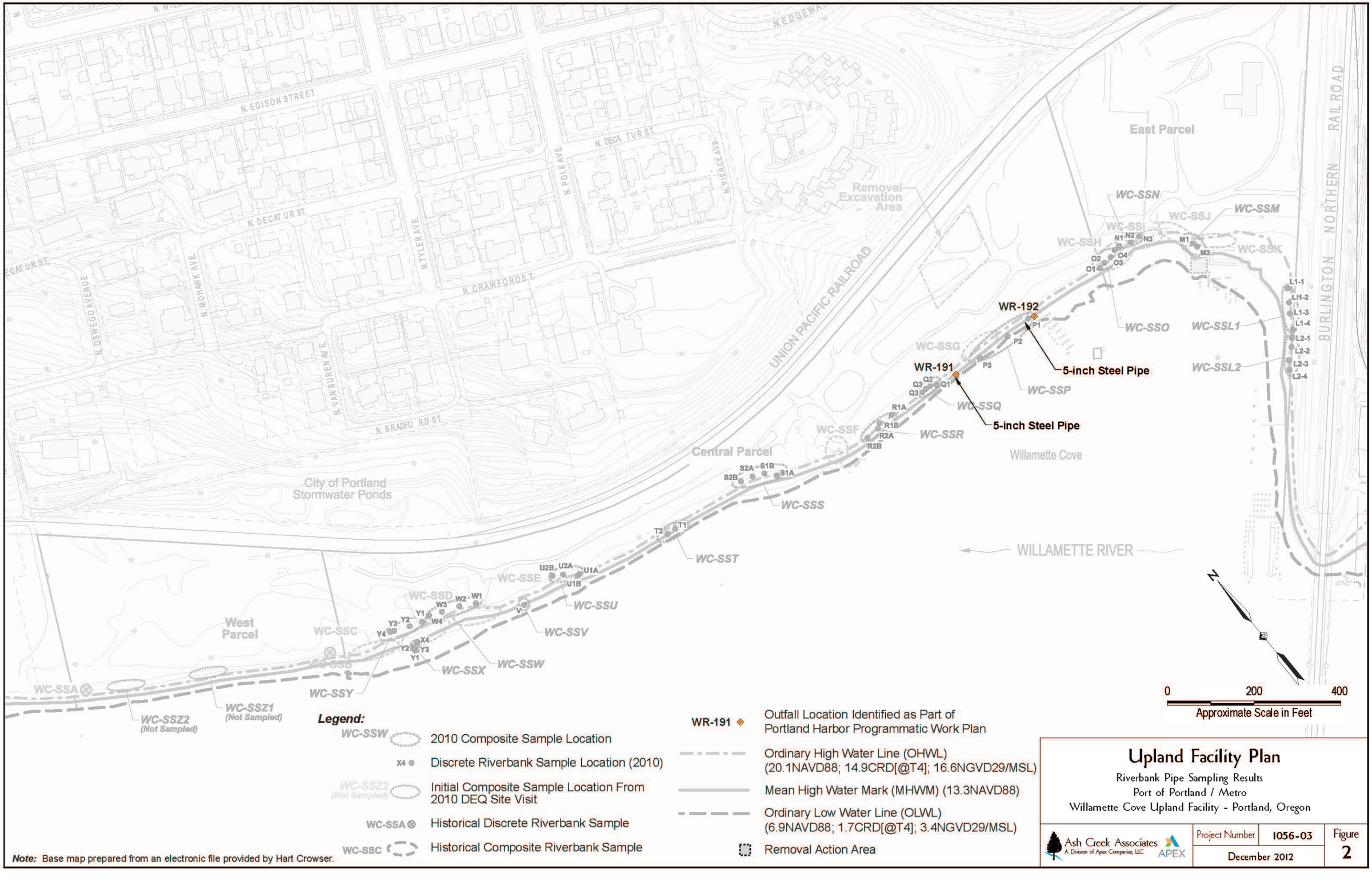

Legend:

- WC-SSW — 2010 Composite Sample Location
- X4 — Discrete Riverbank Sample Location (2010)
- WC-SSZ2 (Not Sampled) — Initial Composite Sample Location From 2010 DEQ Site Visit
- WC-SSA — Historical Discrete Riverbank Sample
- WC-SSC — Historical Composite Riverbank Sample
- WR-191 — Outfall Location Identified as Part of Portland Harbor Programmatic Work Plan
- Ordinary High Water Line (OHWL) (20.1NAVD88; 14.9CRD[@T4]; 16.6NGVD29/MSL)
- Mean High Water Mark (MHWM) (13.3NAVD88)
- Ordinary Low Water Line (OLWL) (6.9NAVD88; 1.7CRD[@T4]; 3.4NGVD29/MSL)
- Removal Action Area

Note: Base map prepared from an electronic file provided by Hart Crowser.

Upland Facility Plan

Riverbank Pipe Sampling Results
Port of Portland / Metro
Willamette Cove Upland Facility - Portland, Oregon

Ash Creek Associates
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APEX

Project Number	1056-03	Figure
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Attachment A

Photograph Log

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 1	
Photo Date: 9/5/2012	
Orientation: East	
Description: Looking from WR-191 toward WR-192 and the inner cove. The white circle highlights location of WR-192.	

Photo No: 2	
Photo Date: 10/31/2012	
Orientation: None	
Description: WR-191. The white arrow highlights the 5-inch steel pipe. The white oval highlights the sampleable soil located approximately 1.5 feet downslope from the end of the pipe.	

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 3 **Photo Date:** 10/31/2012 **Orientation:** None **Description:** WR-191. No flow was observed from the pipe.	

Photo No: 4 **Photo Date:** 10/31/2012 **Orientation:** None **Description:** The white oval highlights the end of WR-192.	

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 5	
Photo Date: 10/31/2012	
Orientation: None	
Description: WR-192. No flow was observed from the pipe.	

Photo No: 6	
Photo Date: 10/31/2012	
Orientation:	
Description: WR-191 sample location.	

Attachment B

Selected Standard Operating Procedures

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Ash Creek Associates (ACA) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs), for the presence of petroleum hydrocarbons using a sheen test, and for non-aqueous phase liquids (NAPLs) using dyes and UV light. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes)
- Glass jars (with aluminum foil) or resealable bags
- NAPL Dye (such as OilScreen DNAPL-Lens) if needed for NAPL screening
- UV Light Box (if needed for NAPL screening)

3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID (with a 10.2 eV probe) and for the presence of petroleum hydrocarbons using a sheen test. If the presence of NAPLs is suspected, then screening using dye and UV light is also to be completed. The PID used on site will be calibrated on a daily basis according to the manufacturer's specifications. The PID is also used as a safety tool. The PID can be used to monitor air during activities where vapors may be present in the breathing space. Document all calibration activities and field observations per SOP 1.1. The field screening procedures are summarized below.

PID Calibration Procedure:

- Zero the PID using ambient air from the general area where the work will be done.
- A standard gas of 100 ppm isobutylene gas is then used to calibrate the PID. If questionable readings are encountered, the PID will be recalibrated using new 100 ppm isobutylene gas.

PID Screening Procedure:

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag or glass jar.
- Seal the bag or jar (with aluminum foil) and shake to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature.
- Carefully insert the intake port of the PID into the plastic bag or jar.
- Record the sample concentration in the field notes.

Sheen Test Procedure:

- Following the PID screen, add enough water to the bag/jar to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize.

No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen, irregular spread, not rapid. Biological content may produce a slight sheen (typically platy/blocky).
Moderate Sheen (MS)	Light to heavy coverage, may have some color/iridescence, spread is irregular to flowing, few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface may be covered with sheen.

NAPL Dye Procedure:

- Dye can be either liquid form, dissolvable tablet, or spray applied.
- Follow manufacturers instructions for specific product used.
- NAPL testing is completed after other field screening and sample collection is complete.
- For OilScreen DANPL-Lens dye, the remaining soil sample is sprayed along its length so the soil surface is visibly wetted. A royal blue color of the dye about one minute after spraying would be considered a positive indication of NAPL.

UV Light Screening Procedure:

- UV Light Screening involves placement of a portion of the soil sample into a resealable plastic bag (which can be the same as used for PID screening, but before sheen test is performed).
- The sample was then examined in a dark space under UV light using a small, portable UV light box.
- The plastic bag is manipulated during examination to squeeze fluid against the bag beneath the lamp.
- Fluorescence (glowing color) indicates presence of NAPLs.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods used for obtaining surface soil samples for physical and/or chemical analysis. For purposes of this SOP, surface soil (including shallow subsurface soil) is loosely defined as soil that is present within 3 feet of the ground surface at the time of sampling. Various types of sampling equipment are used to collect surface soil samples including spoons, scoops, trowels, shovels, and hand augers.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Spoons, scoops, trowels, shovels, and/or hand augers. Stainless steel is preferred.
- Stainless steel bowls
- Laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by Health and Safety Plan)

3. METHODOLOGY

Project-specific requirements will generally dictate the preferred type of sampling equipment used at a particular site. The following parameters should be considered: sampling depth, soil density, soil moisture, use of analyses (e.g., chemical versus physical testing), type of analyses (e.g., volatile versus non-volatile). Analytical testing requirements will indicate sample volume requirements that also will influence the selection of the appropriate type of sampling tool. The project sampling plan should define the specific requirements for collection of surface soil samples at a particular site.

Collection of Samples

- Volatile Analyses. Surface soil sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2-7.
- Other Analyses. Once the targeted sample interval has been collected, the soil sample will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil sample in the stainless steel bowl with the sampling tool or with a clean teaspoon or spatula until a uniform mixture is achieved. If packing of the samples into the bottles is necessary, a clean stainless steel teaspoon or spatula may be used.

General Sampling Procedure:

- Decontaminate sampling equipment in accordance with the Sampling and Analysis Plan (SAP) before and after each individual soil sample.
- Remove surface debris that blocks access to the actual soil surface or loosen dense surface soils, such as those encountered in heavy traffic areas. If sampling equipment is used to remove surface debris,

the equipment should be decontaminated prior to sampling to reduce the potential for sample interferences.

- When using a hand auger, push and rotate downward until the auger becomes filled with soil. Usually a 6- to 12-inch long core of soil is obtained each time the auger is inserted. Once filled, remove the auger from the ground and empty into a stainless steel bowl. If a VOA sample is required, the sample should be taken directly from the auger using a teaspoon or spatula and/or directly filling the sample container from the auger. Repeat the augering process until the desired sample interval has been augered and placed into the stainless steel bowl.

Backfilling Sample Locations:

Backfill in accordance with federal and state regulations including OAR 690-240 (e.g., bentonite requirements). The soils from the excavation will be used as backfill unless project-specific or state requirements include the use of clean backfill material.

Attachment C

Laboratory Analytical Report (CD-ROM)